New or Misunderstood Species of *Commelina* (Commelinaceae) from the *Flora of Tropical East Africa* and *Flora Zambesiaca* Areas

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ABSTRACT. *Commelina disperma* Faden is described from Tanzania and is separated from *C. zenkeri* and *C. macrosperma* by its seeds. *Commelina kituloensis* Faden is described from the southern highlands of Tanzania and the Nyika Plateau of Malawi and Zambia and is distinguished from *C. hockii* by spathe, floral, capsular, and seed characters. *Commelina zenkeri* C. B. Clarke is found to be the correct name for a Ugandan species that was thought to be undescribed.

Key words: Africa, *Commelina*, Commelinaceae, Tanzania, Uganda, Zambia.

With about 100 species, *Commelina* L. is the largest genus of Commelinaceae in Africa. At least 65 species occur in the combined areas of the *Flora of Tropical East Africa* (Kenya, Uganda, and Tanzania) and *Flora Zambesiaca* (Malawi, Mozambique, Zambia, Zimbabwe, and Botswana), for which I am writing family treatments. Previously, I have recognized and described a number of new taxa of *Commelina* from these floristic areas (Faden, 1994; Faden & Alford, 2001). Two further new species of the genus from this region are now well characterized and are described below. A third species, from Uganda, initially thought to be new, has proven to be an apparently rare species from Cameroon. It is described and illustrated because of its apparent disjunct distribution and because it has been misunderstood.

Commelina disperma Faden, sp. nov. TYPE: Tanzania (T4). Kigoma Dist.: Livandabe Mountain, 5°58′S, 30°02′E, alt. 1100–1200 m, tall closed forest with *Pterygota, Newtonia, Blighia, Lecaniodiscus, Pseudospondias, Sterculia, Parkia, Ficalhoa*, 28 May 1997, *S. Bidgood, D. Sitoni, K. Vollesen & C. Whitehouse 4153* (holotype, K; isotype, US 3375780). Figure 1.

Herba perennis; radices crassae non tuberosae; spathae solitariae vel usque ad tres laxe aggregatae, bracteatae, 12–15 mm longae, 8–9 mm altae, marginibus basi 3–4 mm connatis; flores pallide azurei; capsulae biloculares, bivalves, 4 × 5.2 mm, biseminales; semina ellipsoidea, 3.2–3.4 × 2.5–2.6 mm, testa brunnea reticulato aurantiaco.

Perennial herb from a short-creeping rootstock; roots thick, fleshy but not tuberous, dark brown, covered by persistent root hairs; shoots 1 or 2 per plant, erect to ascending, unusually unbranched, not rooting at the nodes, to 60 cm long; internodes to 11.5 cm long, with a line of hook-hairs, at least distally, continuous with the fused edge of the distal sheath. Leaves distichous, sheaths 1–2.3 cm long, ± auriculate at the summit, puberulous with hook-hairs, ciliolate at the summit; lamina petiolate (at least in the distal leaves), lanceolate-elliptic (to ovate-elliptic), 5–11 × 2–3 cm, apex acuminate to attenuate, base strongly oblique, one side rounded, the other side cuneate, margins scabrous, also ciliate basally, adaxial surface scabrous with scattered prickle-hairs, abaxial surface shortly hirsute with uniseriate hairs and a smaller number of hook-hairs. Spathes terminal, solitary or up to 3 loosely clustered per shoot, bracteate; peduncles 6–10 mm long, puberulous with a line of hook-hairs; spathes 12–15 mm long, 8–9 mm high, not falcate, apex acute to obtuse, mucronate, base truncate to hastate, margins fused for 3–4 mm, puberulous along the fused portion with hook-hairs and uniseriate hairs, otherwise glabrous, surfaces glabrous, green but whitish basally; upper cincinnus lacking or vestigial and included in the spathe, lower cincinnus 2(to 4)-flowered, its peduncle 7–10 mm long, glabrous, bracteoles present. Flowers bisexual, very pale blue; pedicels 3–5 mm long; upper sepal hooded, 2.6–3 mm long, lateral sepals ovate-elliptic to obovate-elliptic, completely fused in bud, fused less than half their length in flower, ca. 3.2 × 2.5 mm; paired petals held erect, pale blue, claws ca. 3.5 mm long, lower petal linear-lanceolate, 2–2.5 × 0.5 mm; staminodes 3, filaments ca. 3.5 mm long, antherodes ca. 0.5–0.75 mm diam., yellow, cruciform or irregular; lateral stamens with filaments ca. 6.5–7 mm long, anthers oblong, 1–1.5 mm long; medial stamen with filament 5–5.5 mm

Figure 1. *Commelina disperma* Faden. —A. Habit. —B. Spathe, lateral view. —C. Perfect flower, front/lateral view. —D. Capsule, dorsal view. —E. Seed, dorsal view. —F. Seed, ventral view. All from *Bidgood, Sitoni, Vollesen & Whitehouse 4153* (K), except C, which was drawn from a slide of the plant taken in the field by Kaj Vollesen. Illustration by A. R. Tangerini.

long, anther saddle-shaped, strongly curved, ca. 1.5–2 mm long, yellow; ovary ca. 1.5 mm long, style ca. 7–8 mm long, stigma capitate. Capsules biloc-ular, bivalved, broadly elliptic to obovate in outline, 4 × 5.2 mm, olive, apex truncate, locules 1-seeded. Seeds ellipsoid, not compressed, 3.2–3.4 × 2.5–2.6 mm, testa dark brown, with a low, raised, dull orange reticulum forming radially elongate cells on the dorsal surface, with transverse walls sometimes interrupted, densely white farinose within the retic-ulum; hilum slightly raised, straight.

Habitat. Tall closed forest with *Pterygota, Newtonia, Blighia, Lecaniodiscus, Pseudospondias, Sterculia, Parkia, Ficalhoa*; 1100–1200 m.

Flowering. Flowering and fruiting in May.

Chromosome number. Unknown.

Distribution. Western Tanzania (T4); known only from the type.

The flower was drawn from a slide of a plant taken by one of the collectors (Kaj Vollesen). It was not a close-up, so the size of the flower is approx-imate, and some details may not be fully accurate. However, the ascending petals facing each other were clearly observable. If this character should prove consistent, it would be distinctive of the spe-cies.

Among East African species *Commelina disper-ma* is most similar to *C. zenkeri* from Uganda. The two species have in common: a similar habit with more or less tufted, ascending, typically un-branched shoots with distichous, petiolate leaves with a very oblique base; spathes shortly pedun-culate, sometimes or regularly bracteate, solitary or two to three in loose clusters at the ends of the shoots; paired sepals at least partially fused; medial petal very small; and capsule two-seeded. This spe-cies differs from *C. zenkeri* by its thick roots, upper cincinnus lacking or vestigial (vs. upper cincinnus often developed and producing a male flower), se-pals fused less than half their length (vs. more high-ly fused), and seeds with a low, raised, dull orange reticulum on the dorsal surface (vs. seeds uniformly brown, smooth).

If seed features are significant, then *C. disperma* may be most closely related to *C. macrosperma* from Sierra Leone, Ghana, and Nigeria, which also has a two-seeded capsule and seeds with a raised or-ange reticulum. The latter species differs by lack-ing thick roots, by having smaller flowers (e.g., paired petals ca. 6 × 4 mm), the paired petals al-ways pure white (vs. pale blue), the medial petal broad, the capsules larger (ca. 6 × 6 mm vs. 4 × 5.2 mm), and the seeds longer and proportionally narrower (4.5 × 2.3–2.5 mm vs. 3.2–3.4 × 2.5–2.6 mm). The testa pattern in *C. macrosperma* dif-fers from *C. disperma* in being foveolate-reticulate (vs. reticulate), the reticulum walls of the former thicker, smoother, higher and not tending to be ra-dially elongate or having occasional transverse walls interrupted, the depressions between the walls smaller, not radially elongate and more po-lygonal than rectangular.

Commelina macrosperma has the highly unusual chromosome number of $2n = 22$ (also reported as $2n = 20$ by Morton, 1956, 1967; see Faden & Suda, 1980, for discussion), which otherwise occurs only in *C. benghalensis* L. No living material of *C. disperma* has been obtained, so its chromosome number is unknown.

According to one of the collectors (Vollesen, pers. comm.) the type locality, near Lake Tangan-yika, is very inaccessible and has yielded other in-teresting species. It is unclear how floristically dis-tinct this forest patch might be from other forests near or along the lake. They would be the obvious habitats to search for further populations of *C. dis-perma.*

Commelina kituloensis Faden, sp. nov. TYPE: Tanzania (T7). Njombe Dist. [Makete Dist. on label]: Kitulo Plateau, 36 km E of turnoff on Mbeya–Tukuyu road, 9°04′52″S, 33°51′27″E, alt. 2880 m, new potato field and adjacent montane grassland, 27 June 1996, *R. B. Fa-den, S. M. Phillips, A. M. Muasya & E. Macha 96/438* (holotype, US 335706; isotypes, BR, EA, NHT, K, MO, PRE, US 335708). Figure 2.

Herba perennis; radices bases 2–3 mm crassae, albi-dae; spathae solitariae, 1.7–4.5(–5.3) cm longae, 0.6–1.8 cm altae, marginibus haud connatis, plerumque ciliatis, pagina dense vel sparsim hirsuta, pedunculo spathae (2.5–) 3–10(–15) cm longo; cincinnus superior plerumque florem unicum masculinum efferens; flos sepalis lateralibus per 2/3–7/8 longitudinum connatis, limbo petalorum binato-rum valde undulato, petalo inferiore plano a petalis binatis discolori; capsulae triloculares, bivalves usque ad 5-sem-inales; semina loculis ventralibus testa foveato-reticulato.

Perennial; roots numerous, 2–3 mm thick at the base but not tuberous, whitish; shoots annual, tuft-ed, arising from a subterranean base, unbranched or sparsely branched, (10–)15–40(–45) cm tall, erect to ascending or sometimes recumbent at the base, rarely rooting; internodes to 17 cm long, gla-brous or glabrescent to densely white puberulous or finely hirsute. Leaves spirally arranged or disti-chous, sheaths sometimes clustered at the base of the shoots, spaced at least medially, 1–3(–3.5) cm long, with a line of either fine or long hairs along

the fused edge, otherwise the surface glabrous to puberulous or hirsute, ciliate at the apex, lamina sessile, planar or conduplicate, oblong-lanceolate to linear-lanceolate or, rarely, linear or ovate-elliptic, 4–12(–16) × (0.3–)0.5–2(–2.5) cm, apex acuminate to acute, base cuneate to rounded, margins ciliate or glabrous, not scabrous, surfaces densely hirsute to glabrous. Spathes arising distally on the shoots, solitary, peduncles (2.5–)3–10(–15) cm long, usually densely hirsute, rarely the pubescence reduced to a single, longitudinal band; spathes 1.7–4.5(–5.3) cm long, 0.6–1.8 cm high, filled with liquid when fresh, usually not at all to very slightly falcate (rarely strongly falcate), the folded edge often somewhat saccate basally, apex acute to acuminate, rarely attenuate, base cordate to hastate, margins free, usually ciliate, occasionally glabrous, surface densely to sparsely hirsute, the veins broadly striped and/or the whole spathe flushed with red or reddish purple (rarely entirely green); upper cincinnus with peduncle 8–16(–24) mm long, short- or long-exserted from the spathe, usually glabrous, occasionally pubescent, usually producing 1 male flower, occasionally the flower bisexual or the cincinnus more than 1-flowered, lower cincinnus with peduncle 7–13 mm long, 5- to 12-flowered, included, glabrous. Flowers bisexual and male, 25–30 mm wide; upper sepal ovate to ovate-elliptic, or rarely lanceolate, 4–6.5(–7) × 2.6–3.2 mm, reddish purple with green veins, glabrous; lateral sepals fused for 2/3–7/8 their length, forming a broad, shallow cup, each sepal broadly elliptic to ovate-elliptic, 5–8 × 3.8–4.8 mm, reddish purple except green on the side where they meet or half reddish purple and half green, glabrous; paired petals pale blue, lavender or purple to nearly white (RHS colors 92D, 97B in *Faden et al. 96/438*, type), 12–18 × 11–14 mm, limb suborbicular to broadly ovate-reniform, strongly undulate, 9–12 × 11–14 mm, apex rounded, base cordate, margins crenate, claw 4–6 mm long, reddish purple; lower petal strongly reflexed to not reflexed, ± planar, with apex not recurved, ovate, 5.3–9 × 3.3–4.3 mm, white or cream; staminodes 3, ± equal, filaments 3–7 mm long, reddish purple, antherodes 6-lobed, 1.5–2.4 × 1.5–1.8 mm, yellow, the small polliniferous lobes sometimes with faint darker markings; lateral stamens with filaments divergent, arcuate-decurved, 6–11 mm long, flesh pink (to nearly white), anthers lanceolate-elliptic to elliptic, 1.6–3 × 0.75–1.3 mm, connective gray-green, pollen sacs blue-black (anthers oblong and entirely dark when dried), dehiscence extrorse, pollen creamy yellow; medial stamen with filament recurved so that the anther is held among the antherodes, filament 4–7 mm long, flesh pink at base, reddish purple distally, anther saddle-shaped, 2.2–3.5 × 1.7–2.1 mm, yellow with a broad, transverse, nearly black patch to almost entirely blue-black, with prominent, sterile, yellow basal lobes, pollen orange-yellow; ovary ovoid-ellipsoid, ca. 1.3–1.7 × 0.9 mm, green, style greatly exceeding the stamens and held above them, 7–16 mm long, arcuate decurved, then recurved at the apex, reddish purple, shading to blue-purple at the apex, stigma small, blue-purple. Capsules trilocular, bivalved, up to 5-seeded, partly covered by the large, marcescent upper sepal, oblong-elliptic, (4–)5–6 × 2.4–3 mm, weakly or strongly beaked, when immature green with a reddish apex, when mature medium brown, or sometimes the ventral valve flushed with reddish purple, dorsal valve ± deciduous, dorsal locule 1-seeded or empty, indehiscent, ventral locules (none to)2-seeded, dehiscent. Dorsal locule seed attached to the capsule wall, strongly dorsiventrally compressed, elliptic in outline, ca. 2.5 × 1.7 mm, testa brown, ± alveolate, with or without a longitudinal, mid dorsal ridge, hilum straight, slightly raised. Ventral locule seeds dorsiventrally compressed, ovate or deltate to transversely elliptic in outline, (1.45–)1.65–2.6 mm × (1.5–)1.7–1.8 mm, testa dark brown or gray-brown, foveate-reticulate, sometimes the depressions radially elongate, with prominent, narrow, radial ridges between them or the testa essentially radially ridged, ridges and higher spots rugose with white or ± concolorous bead-like particles, these usually in a single row, but occasionally in multiple rows and ± obscuring the depressions, giving the entire surface a granular appearance, the depressions sometimes with slightly paler particles, farinose granules lacking, embryotega concolorous or contrasting with testa, with a short or moderately long, blunt apicule, hilum dark brown, short, straight, flush with the surface or slightly raised.

Habitat. Montane grassland, sometimes in rocky areas, at roadsides or near streams, rarely in stunted *Brachystegia* woodland; (1600–)1830–2880 m in altitude.

Flowering. Flowering October through June, but mainly December to February; flowers were found open between 1400 and 1500 hr. on a cold, overcast day, so the typical flowering time is unknown

Chromosome number. $n = 30$ (Lewis, 1964: 283, as "*Commelina* sp. 10").

Distribution. Southern highlands of Tanzania (T7) and the Nyika Plateau of northern Malawi and northeastern Zambia.

Figure 2. *Commelina kituloensis* Faden. —A. Habit. —B. Spathe, lateral view. —C. Perfect flower, front/lateral view. —D. Paired petal, showing shape and venation. —E. Medial stamen, anther, and part of filament, dorsal view. —F. Antherode and part of filament, ± front view. —G. Immature capsule, with sepals removed, lateral view. —H. Immature

The species that is described here as *C. kituloensis* was recognized and labeled "*Commelina* sp. 'C' aff. *purpurea*" by Brenan in the Kew Herbarium. However, *C. purpurea* C. B. Clarke has trivalved (instead of bivalved) capsules and orange to orange-brown (instead of lavender) flowers, which indicates that the relationships of *C. kituloensis* are elsewhere. I believe that the new species is most closely related to *Commelina hockii* De Wildeman of southern Tanzania, Zambia, Congo (Kinshasa), and possibly Angola because of its capsule type, in combination with its tufted perennial habit, large spathes with free margins, apparent abundant liquid in the spathes, and numerous buds in the lower cincinnus. It differs from *C. hockii* by its more numerous, thinner, whitish (vs. dark) roots, usually densely pubescent foliage and spathes, shorter (1.7–4.5(–5.3) cm long vs. 3–9(–11) cm long), proportionally broader spathes usually with a much less attenuate apex, usually a solitary flower in the upper cincinnus (vs. upper cincinnus typically 7- to 14-flowered), the upper cincinnus peduncle usually shorter (8–16(–24) mm long vs. (13–)16–33 mm long), lower sepals fused 2/3–7/8 (vs. up to 1/4) of their length; paired petals usually lavender to purple (although often described as "blue" by collectors) (vs. paired petals usually white or occasionally pink), lower petal more or less planar, ovate, contrastingly colored with the paired petals, apex not recurved (vs. lower petal shallowly boat-shaped, elliptic to oblong-elliptic or ovate-elliptic, concolorous with the paired petals, apex recurved), and smaller capsules (4–6 mm long vs. 8–9 mm long) and seeds (mostly 1.65–2.6 × 1.7–1.8 mm vs. 2.5–3.5 × 1.9–2 mm). In addition, *C. kituloensis* occurs at generally higher elevations than *C. hockii* ((1600–)1830–2880 m vs. (1250?–)1650–1980 m).

Commelina kituloensis has a number of unusual features. Fresh spathes are full of liquid, which is apparently rare for a species whose spathes do not have fused margins. The strongly undulate petals are much more three-dimensional than in typical *Commelina* flowers. The large, flat, contrastingly colored lower petal is also distinctive. The high degree of fusion in the lateral sepals is very unusual when the lower petal is so large and conspicuous. Although most collectors have termed the flowers blue, they are not the typical sky blue of species such as *C. benghalensis* L. or *C. erecta* L., but rather—at least in the type collection—a blue mixed with violet.

Two of the Malawian collections (*Phillips 746* and *Benson 394*) and the single Zambian collection (*Simon et al. 1638*) seen are atypical. *Simon et al. 1638* has the narrowest leaves (minimum 3 mm wide) of any examined specimen of *C. kituloensis*, and *Phillips 746* and *Benson 394* show a tendency to produce a multiflowered upper cincinnus, with these present in at least three of the nine spathes on the former collection and two of the four spathes on the latter. In two of the spathes of *Phillips 746* the upper cyme has at least seven buds, whereas in *Benson 394* the two upper, multiflowered cymes appear to have five and three buds respectively. Not more than three buds have been seen on either of the Tanzanian collections that show an occasional multiflowered upper cincinnus (*Stolz 2354*, from an unusual spathe, and *Clair-Thompson 870*).

The most atypical specimen that I have included in *C. kituloensis* is *Richards 18563*. The specimen has the longest, most falcate spathes, with among the most attenuate apices seen in this species. The spathes also seem to be entirely green, which is unusual in *C. kituloensis*. Were it not for the plant's dense pubescence, flowers described as "blue," and occurrence at high elevation (2100 m) it would be a much better match for *C. hockii* than for the new species.

Several specimens from lower elevations that bear some resemblance to *C. kituloensis* have been excluded. *Richards 17286* (K), *Lewis 6185* (K), and *Lewis 6226* (K, US), all from Mwinilunga District, Zambia, between 1130 and 1280 m elevation, differ from *C. kituloensis* by having thick roots, spathes glabrous except for ciliate margins, and a many-flowered upper cincinnus. They may represent an undescribed species. It is noteworthy that Lewis (1964) reported the meiotic count of $n = 30$ for *Lewis 6185* and *6226* (his "Species 9"), the same count as he reported for *Lewis 6085* (his "Species 10"), which is *C. kituloensis*.

Richards 13833 (K), from Mbeya District, Tan-

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capsule, with sepals removed, dorsal view. —I. Mature capsule, lateral view, the upper sepal (left) completely covering the dorsal capsule valve, the paired sepals (right) shriveled, revealing the ventral capsule valve. —J. Dorsal locule seed, dorsal view. —K. Dorsal locule seed, ventral view. —L. Ventral locule seed, dorsal view. —M. Ventral locule seed, ventral view. A is from *Faden, Phillips, Muasya & Macha 96/438* (US sheet 3350706), a field photograph of the same plant, and a photograph of the root system of a field-collected plant; B, D–G are from FAA-preserved, field-collected material of *Faden, Phillips, Muasya & Macha 96/438*; C is from a close-up slide of *Faden, Phillips, Muasya & Macha 96/438*, taken in the field by the author; and I–M are from *Faden, Phillips, Muasya & Macha 96/421*. Illustration by A. R. Tangerini.

zania, was growing in woodland at 1400 m. It differs from *C. kituloensis* in the leaves scabrous above, but otherwise glabrous, with margins scabrous apically, and spathes scabrous or finely hirsute only basally, with margins sparsely ciliate only basally. The flowers were described as blue and small by the collector. It is possible that this specimen represents a lower elevation form of *C. kituloensis*, but unless and until it can be connected to the higher elevation collections by either intermediate forms or congruent, distinctive reproductive features, it is best excluded from the species.

Lovett 1288, which comes from the second lowest elevation (1830 m) recorded for *C. kituloensis*, is also recorded from *Brachystegia* woodland. When we visited the locality, Lake Ngowasi Dam, in 1996, the habitat seemed quite wrong for the species. However, this was after the rainy season had ended, so not finding the plant was hardly proof of its absence. Clearly, these lower elevational plants need further collection and study.

One of the most unusual features of *C. kituloensis*, and perhaps the most important reason why it has remained unnamed for so long, despite the numerous collections, is the apparent scarcity of seed production. Only a single specimen at Kew was found to have ripe seeds. In the field, albeit when only old plants were available, intensive searching produced few mature seeds. From the shape of the capsules collected one could conclude that rarely do all five seeds develop and mature. Whether this is due to lack of pollination, post-pollination incompatibility, the cold weather, or perhaps some combination of factors is unknown.

The type collection of *C. kituloensis* was made in late June, a time of year when this species would not ordinarily have been flowering, yet the plants were in full flower. Just 4 km down the road another population was found (*Faden et al. 96/421*) in which the shoots of all specimens were completely dry. The significant difference was the habitat. The dried plants were growing in undisturbed grassland. The flowering plants at the type locality, however, were for the most part growing in a recently planted potato field. It is possible that either the cultivation of the ground per se and/or the addition of fertilizer, pesticide, or herbicide stimulated the dormant plants of *C. kituloensis* to resume growth, providing us with a serendipitous opportunity to see, record, and collect the plants in flower. The cold weather and overcast skies probably were responsible for our finding the flowers open in mid afternoon.

Paratypes. MALAWI. **Rumpi Distr.:** Nyika Plateau, 7 km from Kasaramba View Point on road to Chelinda Camp, 2480 m, 14 May 1970, *Brummitt 10715* (SRGH); Nyika Plateau, Kasalamba, [= Kasaramba] 7500 ft. [2285 m], 24 May 1967, *Chimphamba 52* (SRGH); Nyika Plateau, Kasaramba road, 8000 ft. [2440 m], 8 Jan. 1974, *Pawek 7871* (K); Nyika Plateau, 7500 ft. [2285 m], 6 Dec. 1975, *Phillips 507* (SRGH, mixed collection with *C. neurophylla*); Nyika Plateau, 7600 ft. [2315 m], 27 Dec. 1975, *Phillips 746* (K); Nyika Plateau, L. Kaulime, 2190 m, 18 Feb. 1961, *Mrs. Richards 14382* (K); Nyika Plateau, near Zambia Rest House, ca. 7000 ft. [2135 m], 5 Feb. 1968, *Simon, Williamson & Ball 1638* (K); Nyika Plateau, Chelinda-Zambia Rest House road, near rest house, 10°33′S, 33°43′E, 11 Dec. 1981, *Van der Linden 278* (BR). TANZANIA. T7. **Iringa Distr.:** Lake Ngwazi [= Ngowasi] Dam end, 8°30′S, 35°15′E, 1830 m, 1 Jan. 1987, *Lovett 1288* (K, US); Irundi Hill, 8°30′S, 35°15′E, 2000 m, 6 May 1987, *Lovett, Lovett, Keeley & de Lyser 2086* (US). **Mbeya Distr.:** Luleza, Mbeya, 1850 m, 9 Feb. 1975, *Aleyung 246* (K); Mbeya Range, ca. 8 mi. [12.9 km] NE of Mbeya, 7200 ft. [2195 m], 24 Oct. 1962, *Lewis 6085* (K, US); Mbeya Mt., NE of peak, 2500 m, 15 May 1956, *Milne-Redhead & Taylor 10206* (K); Mbeya Peak Forest Reserve, ca. 8000 ft. [2440 m], 14 Nov. 1958, *Myembe 98* (K); Mbeya Mt., 2100 m, 13 Dec. 1962, *Mrs. Richards 17037* (K, SRGH); Chimala Escarpment, above Kitakalo [= Kitakala] Mission, 2100 m, 5 Dec. 1983, *Mrs. Richards 18563* (K); S slopes of Poroto Mts., 3 Mar. 1932, [collector's name illegible] *706* (K). **Njombe Distr.:** [Makete Distr. on label], Kitulo Plateau, 32 km E of the turnoff on Mbeya–Tukuyu road, 9°03′27″S, 33°50′23″E, 2850 m, *Faden, Phillips, Muasya & Macha 96/421* (EA, K, NHT, US); Kikondo Village, 2300+ m, 15 Nov. 1982, *Leliyo 321* (K), 25 Apr. 1983, *Leliyo 409* (K); Kitulo Plateau, 2400 m, 5 Jan. 1957, *Mrs. Richards 7465* (K). **Njombe/Mbeya Distr.:** Kitulo Sheep Station, 9000 ft. [2745 m], 7 Feb. 1970, *Fuller 46* (K); Kitulo (Elton) Plateau, banks of small tributary of Ndumbi River just E of bridge on Matamba–Kitulo road, 9°03′S, 33°55′E, 2560 m, *Gereau, Lovett & Mtweve 3181* (US); Kitulo Plateau, 9°00′S, 33°50′E, 2800 m, 12 Dec. 1989, *Lovett, Sidwell & Kayombo 3666* (US); Elton Plateau, 2100 m, 25 Jan. 1961, *Mrs. Richards 14180* (K); Kitulo Plateau, 9°05′S, 33°58′E, 2400 m, 1 Mar. 1991, *Suleiman & Fundi 22* (US). **Rungwe Distr.:** Upper Kiwarar [= Kiwira] Fishing Camp between Poroto & Rungwe Mts., 6600–7000 ft. [2010–2135 m], 29 Nov. 1958, *Napper 1189* (K, SRGH); Kiwira Forestry Station, 2400 m, 9 Feb. 1961, *Mrs. Richards 14332* (K); Rungwe Mt., upper fishing camp, Kawara [= Kiwira] River, 2250 m, 9 Dec. 1963, *Mrs. Richards 18628* (K); Kyimbila, 8 Dec. 1913, *Stolz 2354* (BR, K). **District Uncertain:** Mbou(?), Jassal, 5500 ft. [1675 m], 14 Nov. 1932, *Davies 672* (K). **Locality Unknown:** 11 Mar. 1932, *Clair-Thompson 870* (K). ZAMBIA. **District Unknown:** Nyika Plateau, ca. 2 mi. [3.2 km] from Government Rest House, 7000 ft. [2135 m], 1 Jan. 1964, *Benson NR394* (K).

Commelina zenkeri C. B. Clarke, in Thiselton-Dyer, Flora of Tropical Africa 8: 59. 1901. TYPE: Cameroon: Yaoundé-Station, alt. 800 m, 1890–1894, *Zenker & Staudt 432* (holotype, K). Figure 3.

Perennial 15–40 cm tall; roots thin, fibrous; shoots ± tufted, at least in young plants, erect to ascending or decumbent, branching and rooting

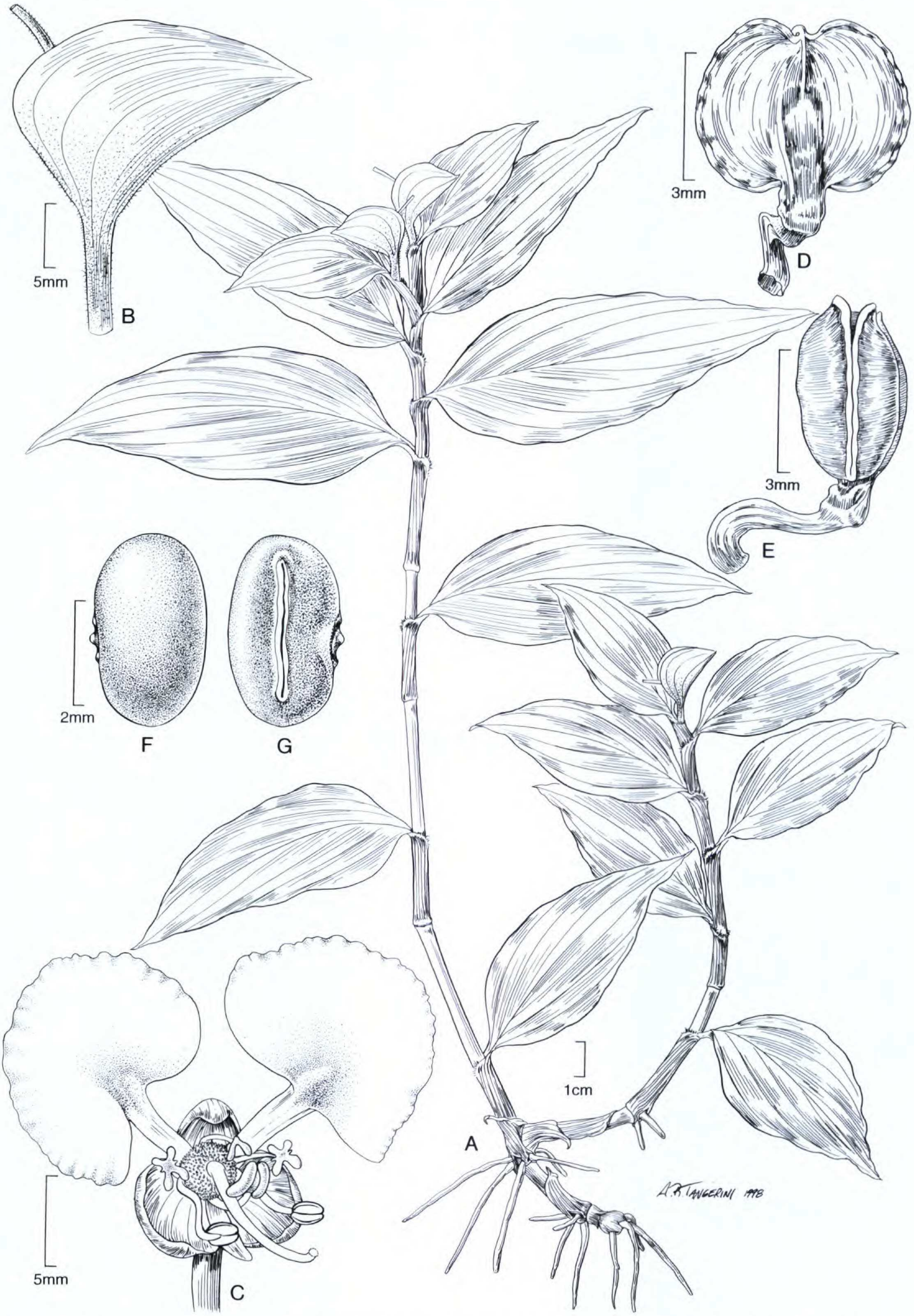

Figure 3. *Commelina zenkeri* C. B. Clarke. —A. Habit. —B. Spathe, lateral view. —C. Perfect flower, front view. —D. Capsule, dorsal view. —E. Capsule, lateral view. —F. Seed, dorsal view. —G. Seed, ventral view. All from *Poulsen s.n.* in *University of Copenhagen Botanical Garden P1996–5327* (*SI97–065*), cultivated at the Smithsonian Institution. Illustration by A. R. Tangerini.

only near the base, flowering shoots ascending, unbranched; internodes to 10 cm long at the base of the shoots, much reduced and largely covered by sheaths distally, green, glabrous. Leaves distichous, sheaths 1–2 cm long, not auriculate at the apex, prominently ribbed, green, puberulous with hook-hairs and uniseriate hairs, at least along the fused edge, ciliolate or ciliate at the apex with whitish hairs to 2 mm long; lamina petiolate (or sessile), lanceolate-oblong to lanceolate-elliptic, ovate-elliptic or ovate, (2–)2.5–10.5 × 1–3(–3.7) cm, apex acute to acuminate, rarely rounded (in ovate leaves), base strongly oblique, usually one side rounded, the other side cuneate, margins ± planar, scabrous apically, adaxial surface glabrous to puberulous, sometimes scabrous (with papillae or prickle-hairs), abaxial surface puberulous, especially along the midrib, with hook-hairs, or glabrous, sometimes reddish, "petiole," when present, to 6 mm long, puberulous abaxially. Spathes terminal, solitary or sometimes 2 together, ebracteate or sometimes bracteate, peduncles 4–10 mm long, puberulous with a line of hook-hairs or glabrous except for a few minute hairs at the apex; spathes ± funnelform, 1.2–2 cm long, 0.8–1.3 cm high, not falcate to slightly falcate, apex acute to obtuse, base ± truncate (to cordate), margins fused basally for 2–5 mm, ciliate or ciliolate along the fused portion with hook-hairs, otherwise glabrous, surfaces green, whitish toward the base, sparsely puberulous basally or glabrous; upper cincinnus exserted or enclosed within the spathe, to 17 mm long and puberulous with hook-hairs when exserted, producing 1 male flower, or vestigial, lower cincinnus with peduncle 6.5–9.5 mm long, glabrous, 1–5-flowered, bracteolate. Flowers bisexual and male, 1.4–1.8(–2) cm wide; pedicel of upper cincinnus flower 4.5–6 mm long, pedicels of lower cincinnus flowers 2.5–4.5 mm long; upper sepal ovate or ovate-elliptic to oblong-elliptic or obovate-oblong, strongly hooded at the apex, the apex sometimes deflexed, 2.5–3.5 × 1.7–3 mm, glabrous, hyaline-white or greenish white, lateral sepals ovate-orbicular to obovate-elliptic or ovate-elliptic, 3.3–4.5 × ca. 2.5–3.5 mm, fused laterally for at least 3/4 of their length into a shallow cup, glabrous, hyaline with a whitish midrib; paired petals ca. 9–12 × 8–11 mm, limb broadly ovate or ovate-reniform to ovate-deltate, ca. 5–7 × 8–11 mm, blue or lavender to white, sometimes sky blue except medially where white, apex rounded to slightly emarginate, base truncate to broadly cuneate, margin crenate, undulate, sometimes erose or irregularly cleft, claw 3.5–5 mm long, white; medial petal inconspicuous, lanceolate to lanceolate-elliptic, lanceolate-oblong, oblanceolate or subulate, 2.8–4 × 0.75–1.5 mm, hyaline-white or white, apex rounded; staminodes 3, equal, filaments 3.5–5 mm long, white or whitish in basal 3/4, yellow distally, antherodes often different in form between the medial and lateral staminodes, ± cruciform, although frequently some lobes reduced, ca. 0.7–1.5 × 0.7–1 mm, yellow; lateral stamens with filaments ± parallel or slightly to moderately divergent, gently sigmoid, 5–6 mm long, white or yellowish white, anthers elliptic to ovate, ca. 0.8–1.4 mm long, connective yellow, sutures dark blue, pollen golden yellow; medial stamen with filament pointing forward to slightly recurved, sometimes strongly deflexed at the apex, ca. 3.5–5.5 mm long, white or whitish in basal 2/3, yellow distally, anther saddle-shaped, ca. 1.5–2 mm long, completely yellow or connective yellow and sutures blue, pollen golden yellow; ovary elliptic to orbicular-elliptic or obovate-orbicular in outline, dorsiventrally compressed, ca. 1.3 × 1.1–1.2 mm, densely covered with glandular microhairs, their secretions giving it a papillose appearance, dorsal locule abortive, sometimes represented by a low hump, ventral locules 1-ovulate, style sigmoid, 6–8 mm long, white, grading to bluish purple, lavender, or pale lilac distally, stigma capitate to slightly 3-lobed, pale lilac, lavender, or yellow. Capsules bilocular, bivalved, broadly elliptic, ca. 4–4.5 × 5 mm, the walls thin-textured, apex emarginate, locules 1-seeded. Seeds ellipsoid, ca. 3.5–4 × 2.3–2.5 mm, not compressed, testa dark brown, smooth, densely white-farinose, embryotega concolorous with the testa, with a short, blunt apicule, hilum ± flush with the surface or raised from a ridge, dark brown.

Habitat. Primary forest on rocky hillsides, mixed evergreen forest, *Cynometra alexandri* (Fabaceae) and *Khaya anthotheca* (Meliaceae) forest, closed canopy, mature forest, sandy soils; (750–?)800–1300 m in altitude.

Flowering. Flowering specimens have been seen from August, September, and February.

Chromosome number. $2n = 90$.

Distribution. Western Uganda (U2, of *Flora of Tropical East Africa* (Polhill, 1988)), south-central Cameroon, and possibly eastern Congo (Kinshasa).

Commelina zenkeri is described in detail herein because it has been considered a rare, local endemic of Cameroon. Description of a new equally rare species from Uganda was the original purpose of this exercise, but the putatively undescribed species has proven to be *C. zenkeri.* A history of the Ugandan plant and its eventual connection with *C. zenkeri* may be instructive of how details that are normally lacking in herbarium specimens of this

genus, e.g., floral features, may be decisive in making taxonomic decisions.

Commelina zenkeri was first collected in Uganda in 1969. The collection (*Faden et al. 69/1119*) could not be named, but the plant was considered possibly related to the West African *C. macrosperma* J. K. Morton because of its apparently two-seeded capsules. Ogwal (1977) did not re-collect or discover additional specimens and merely used my provisional name "*Commelina* sp. aff. *macrosperma*." The plant evidently was not collected again until Axel Poulsen found it in the Budongo Forest in 1995. Over the next two years he made two more collections of fertile material in Uganda, as well as sterile plants from plot studies in Uganda and possibly Congo (Kinshasa). At my request he also obtained living material in 1996 that he established at the University of Copenhagen Botanical Garden and later shared with me. His collections, including the living material, formed the basis for the description of the Ugandan plant and for Figure 3.

Clarke (1901) recognized five African species of *Commelina* with two-seeded capsules. Four of them could readily be distinguished from the Ugandan plant: *C. livingstonii* C. B. Clarke—sometimes considered a subspecies of *C. erecta* L.—because of its narrow leaves and appendaged seeds; *C. obscura* K. Schumann and *C. pyrrhoblepharis* Hasskarl, both synonyms of *C. benghalensis* L., which normally has five-seeded capsules; and *C. aethiopica* C. B. Clarke, which I have not seen, but from Clarke's description of the seeds as "subglobose," it clearly was not the Ugandan plant. The type of the fifth species, *C. zenkeri* C. B. Clarke, *Zenker & Staudt 432* (K), had been examined in February 2000, but the small, sessile leaves of the specimen did not strongly resemble the Ugandan plant. No other collections of what appeared to be a rather obscure species had been recognized.

More recently, a *Commelina* collection made in Cameroon in 1986 (*Faden, Satabié & Mpom 86/1*, US) was reexamined. The plant had originally been identified as "*Commelina* sp. cf. *C. bracteosa* Hasskarl" because of its small bracteate spathes and one-seeded capsule locules. The number of locules in the capsules was unclear because the capsules were old and broken. My first impression of the pressed specimen was that it was much larger than the type of *C. zenkeri* and that it resembled the new Ugandan species.

From cultivated plants of *Faden et al. 86/1*, grown from cuttings brought back from Cameroon, a detailed floral description, one seed, three liquid-preserved flowers, and a provisional chromosome count were obtained. It was concluded that the single seed, because of its shape, must have come from a two-seeded capsule. The seed closely resembled that of the type of *C. zenkeri*, as well as that of the Ugandan plant. The provisional chromosome number obtained from *Faden et al. 86/1* was $2n$ = 88–90, which agreed with a chromosome count of $2n = 90$ that Poulsen (in litt.) wrote had been obtained for the Ugandan plant while in cultivation in Copenhagen. It became necessary to either distinguish the Ugandan plant from *C. zenkeri* or to accept it as this species.

A detailed comparison was made among the two collections determined as *C. zenkeri* from Cameroon and the collections from Uganda. No significant differences in vegetative or spathe characters could be found. Moreover, all of the distinctive floral features that were present in the Ugandan plant—sepals highly fused into a shallow cup, limb of the paired petal more or less truncate at the base, claw white, medial petal very small, narrow and inconspicuous, hyaline-white or white, antherodes (staminode anthers) small, with a strong tendency toward reduced lobes, ovary densely covered with glandular microhairs, the secretions from which give it a papillose appearance, and locules two, each one-ovulate—were also present in *Faden et al. 86/1* from Cameroon. The only seed from *Faden et al. 86/1* closely resembled the numerous seeds from the cultivated Ugandan plant of *Poulsen s.n.* in the *University of Copenhagen Botanical Garden P1996–5327* (*SI97–065*) in size, shape, color, and testa pattern.

The following differences were observed. The blue petals in *Faden et al. 86/1* were darker blue than in any Ugandan plant, and their medial white patch was not observed or recorded in the Ugandan plants. The petals in some flowers in the Ugandan plants had a tendency to have erose or notched margins, which was not observed in the Cameroonian plant. Finally, the seed in the Cameroonian plant had a faint, longitudinal mid dorsal ridge, something that was vaguely suggested in one immature seed but was otherwise lacking in the numerous mature seeds of the Ugandan plant.

The Ugandan plants cannot be separated from Cameroonian *C. zenkeri* on any important characters, and therefore they must belong to this species. The differences observed were either inconsistent (petal margins) or of unknown constancy due to the small sample size (e.g., only one mature seed in Cameroonian *C. zenkeri*), so as to render even the recognition of subspecies untenable.

Specimens that are definitely this species have been seen only from western Uganda and south-central Cameroon. *Poulsen 1186* (C), from Congo

(Kinshasa) (Haut Zaïre Dist.: Okapi Wildlife Reserve, Ituri Forest, NE of Edoro River, 1°33′N, 28°32′E, alt. 750 m, mixed forest in open patch, 11 Mar. 1996) is sterile but closely resembles the Ugandan plants of *C. zenkeri*. Its occurrence in this location would not be unexpected, but fertile material is essential for confirmation. A search through the herbarium of the National Botanic Garden of Belgium (BR) in September 2000 failed to turn up any specimens of *C. zenkeri*, but the search was hardly exhaustive. Similarly, further specimens from Cameroon may have been overlooked or misidentified as *C. bracteosa*.

The relationships of *C. zenkeri* are uncertain. It strongly resembles *C. disperma* and has a similar capsule. For differences, see the discussion herein. They both belong to a species group that includes *Commelina erecta* and *C. bracteosa*, which is characterized by one-ovulate ovary locules, one-seeded capsule locules, fused lateral sepals, usually blue flowers, very reduced lower petal, and the presence of hook-hairs on the leaves. *Commelina bracteosa*, some forms of which resemble *C. zenkeri*, differs primarily by its trilocular, trivalved capsules and subspherical seeds that have a very long apicule on the embryotega. *Commelina erecta* has very narrow leaves, auricles at the summit of the sheath, and appendaged seeds.

The apparent disjunct distribution of *C. zenkeri* at the eastern and western ends of the Congolian forest could have several explanations. It could be an artifact of under-collecting, a manifestation of unrecognized or wrongly named herbarium specimens, or it could be real. *Commelina* species tend to be under-collected because they may be weedy, hard to dry, and difficult to recognize to species in the field. Clearly, *C. zenkeri* specimens may well have been overlooked in herbaria or mistaken for other species. A truly disjunct distribution is also possible. Based on the distributions of plants and animals, Pleistocene refugia have been postulated for the western end of the Congolian forest, which includes the part of Cameroon where *C. zenkeri* occurs, and for the eastern end of this forest, with rainforest having disappeared in the intervening region (Hamilton, 1976; Mayr & O'Hara, 1986). The sterile collection from Congo (Kinshasa) that may be *C. zenkeri* comes from this eastern refugium, whereas the Ugandan plants are from just east of the refugium. Among Commelinaceae the only other species considered to have a similar distribution was an undescribed species of *Polyspatha*, but recent herbarium research has revealed that it also occurs in Ivory Coast, Congo (Brazzaville), and in parts of Congo (Kinshasa) that have not been postulated to have been refugia.

Specimens seen. CAMEROON: **South-Central Prov.:** Nkolbisson, 8 km W of Yaoundé, Akouandoué Hill, S of the town, 3°51′N, 11°28′E, alt. 745–950 m, 23 Jan. 1986, *Faden, Satabié & Mpom* 86/1 (US). UGANDA. U2. **Bunyoro Dist.:** [Masinde Dist. on label]: Budongo Forest Reserve, The Nature Reserve, 1°43′N, 31°31′E, 1000 m, 30 Aug. 1995, *Poulsen (with Nkuutu & Dumba) 863* (C, K, US); Budongo Forest Reserve, Kanyo-Pabidi Block, 1°56′N, 31°44′E, 950 m, 1 Feb. 1996, *Poulsen 1106* (C, US). **Kigezi Dist.:** just outside Queen Elizabeth National Park, South Maramagambo Central Forest Reserve, 4–7 mi. [6.4–9.2 km] up Kaizi–Bitereko road, 18 Sep. 1969, *Faden, Evans, Lye & Lock 69/1119* (EA). **Toro Dist.:** [Kabarole Dist. on label]: Kibale National Park, S of Ngogo Camp, 0°32′N, 30°23′E, 1300 m, 6 June 1997, *Poulsen 1314* (K, US).

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